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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

DAVID W. MILLER, et al.

Group Art Unit: 2125

Examiner: Rao, Sheela S.

Serial No.: 09/535,842

Filed: March 28, 2000

For: SCALABLE MEANS OF SUPPLYING POWER TO A REMOTELY CONTROLLED, SEMI-AUTONOMOUS ROBOT

Attorney Docket No.: 99-082-TAP

APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
U.S. Patent & Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This is an appeal from the final rejection of claims 1-21 of the Office Action dated February 19, 2003. This application was filed on March 28, 2000.

I. REAL PARTY IN INTEREST

The real party in interest is Storage Technology Corporation, a corporation organized and existing under the laws of the state of Delaware, and having a place of business at One Storagetek Drive, MS-4309, Louisville, Colorado 80028-4309, as set forth in the assignment recorded in the U.S. Patent and Trademark Office on March 28, 2000 at Reel 010688/Frame 0354.

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II. RELATED APPEALS AND INTERFERENCES

There are no appeals or interferences known to appellants, the appellants' legal representative, or assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-21 are pending in this application. Claims 1-21 have been finally rejected under 35 U.S.C. §103(a) and are the subject of this appeal.

IV. STATUS OF AMENDMENTS

No amendment after the final rejection has been filed.

V. SUMMARY OF THE INVENTION

In one embodiment, the invention provides an automated library system (100) having a plurality of data cartridges (90). The system comprises a plurality of storage cells (102) to store the plurality of data cartridges. At least one rail (106) is disposed adjacent to the plurality of storage cells, and at least one primary coil (122) is disposed proximate to the at least one rail. A power supply (124) is connected to the at least one primary coil to produce an alternating current in the at least one primary coil. At least one robot (200) is disposed on the at least one rail, the at least one robot being operative to insert and remove the plurality of data cartridges at least one at a time from the plurality of storage cells. A secondary coil (224) is disposed on each of the at least one robots respectively and positioned to inductively couple at least a portion of the alternating current in the at least one primary coil to the at least

one robot. The at least one robot comprises a drive mechanism (210) powered through the secondary coil and configured to move the robot about within the automated library system. (See, for example, Figures 1 and 2, and the specification on page 7, l. 11 through page 9, l. 27).

In another embodiment, the invention provides a robot (200) for use in an automated library system (100) having a controller and at least one primary coil (122) carrying an alternating current. The robot comprises a frame (202). A drive mechanism (210) is attached to the frame and engages the automated library system to move the robot about within the automated library system. An electronics circuit (212) is disposed on the frame and is in communication with the drive mechanism and the automated library system to facilitate control of the drive mechanism in accordance with commands from the controller. A magnetic core (214) is disposed on the frame, the magnetic core having a first core member (216) disposed on one side of the at least one primary coil and a second core member (218) disposed on the opposite side of the at least one primary coil. The second core member engages the first core member to form a closed magnetic path and the second core member moves relative to the first core member to form a gap (234) that allows insertion and removal of the magnetic core from the at least one primary coil. A secondary coil (224) is wound around the magnetic core and is electrically connected to the electronics circuit, the secondary coil inductively coupling at least a portion of the alternating current from the at least one primary coil to the electronics circuit. (See, for example, Figures 1, 2, 4 and 5, and the specification on page 7, l. 11 through page 9, l. 27, and page 11, ll. 1-19).

In a third embodiment, the invention provides a method of operating an automated library system (100) having a plurality of data cartridges (90). The automated library system has at least one robot (200) operative to move adjacent to at least one primary coil (122). The method comprises providing an alternating current in the at least one primary coil, inductively coupling at least a portion of the alternating current in the at least one primary

coil into the at least one robot to produce a secondary alternating current, converting the secondary alternating current into a mechanical movement of the at least one robot, and directing the mechanical movement of the at least one robot to manipulate the plurality of data cartridges at least one at a time and to move the robot about within the automated library system, using a drive mechanism (210) on the robot. (See for example, Figures 1, 2 and 8, and the specification on page 7, l. 11 through page 9, l. 27, and page 13, ll. 4-21).

VI. ISSUE

Whether the Examiner has made a *prima facie* case that the pending claims are unpatentable under 35 U.S.C. §103(a) over U.S. Patent No. 5,646,917 to Miyoshi, et al. (hereinafter Miyoshi) in view of U.S. Patent No. 5,589,859 to Schantz (hereinafter Schantz).

VII. GROUPING OF CLAIMS

Applicant contends that the claims do not stand or fall together. In particular, applicant contends the claims should be grouped as follows:

1. Claims 1-9 (Group I) stand or fall together.
2. Claims 10-16 (Group II) stand or fall together.
3. Claims 17-21 (Group III) stand or fall together.

The claims in each of the Groups I, II and III are believed to be separately patentable over the cited art. Group I provides an automated library system having at least one robot, and a secondary coil disposed on each of the at least one robots respectively and positioned to inductively couple to the at least one robot at least a portion of an alternating current in at least one primary coil where the robot further comprises a drive mechanism

powered through the secondary coil and configured to move the robot about within the automated library system.

Group II provides a robot that comprises a drive mechanism attached to a frame of the robot, wherein the drive mechanism engages the automatic library system to move the robot about within an automated library system. Group II is believed to be separably patentable over Group I since Group II claims the limitations of the robot itself. The configuration provided by Group II may not be limited to the automated library system disclosed in Group I.

Group III provides a method of operating an automated library system having at least one robot, wherein the method includes moving the robot within the system using a drive mechanism on the robot. Unlike Groups I and II, which are directed to a system and an apparatus, Group III concerns a method, and is therefore believed to be separably patentable.

VIII. ARGUMENT

The Examiner has Failed to Make a *Prima Facie* Case that Claims 1-21 are Unpatentable under 35 U.S.C. §103(a) over Miyoshi in View of Schantz

A *prima facie* case of obviousness requires three basic criteria:

> First, there must be some suggestion of motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.
>
> The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure.

Manual of Patent Examining Procedure (MPEP), 8th Edition, August 2001, revised February 2003, §2143 (citing *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)).

Furthermore, "[a] prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention." MPEP §2141.02 (citing *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984)).

Here, the Examiner has rejected claims 1-21 as being unpatentable under 35 U.S.C. §103(a) over Miyoshi in view of Schantz. The Examiner has failed to establish, however, that the combination of Miyoshi and Schantz teach or suggest all the limitations of the Applicant's claimed invention. In particular, independent claim 1 provides an automated library system having at least one robot disposed on at least one rail. The at least one robot is operative to insert and remove a plurality of data cartridges at least one at a time from a plurality of storage cells. A secondary coil is disposed on each of the at least one robots respectively and positioned to inductively couple at least a portion of an alternating current in at least one primary coil to the at least one robot. The at least one robot comprises a drive mechanism powered through the secondary coil and configured to move the robot about within the automated library system.

Independent claim 10 provides a robot for use in an automated library system wherein the robot comprises a drive mechanism attached to a frame of the robot and engaging the automated library system. The drive mechanism is configured to move the robot about within the automated library system. Independent claim 10 also provides a secondary coil wound around a magnetic core that is disposed on the frame. The secondary coil is electrically connected to an electronics circuit. The electronics circuit is disposed on the frame and is in communication with the drive mechanism and the automated library system to facilitate control of the drive mechanism in accordance with commands from the controller. The secondary coil

inductively couples at least a portion of the alternating current from the at least one primary coil to the electronics circuit.

Independent claim 17 discloses a method of operating an automated library system having a plurality of data cartridges. The library system has at least one robot, operative to move adjacent to at least one primary coil. The method comprises inductively coupling at least a portion of an alternating current in the at least one primary coil into the at least one robot to produce a secondary alternating current. The method further comprises converting the secondary alternating current into a mechanical movement of the at least one robot to manipulate the plurality of data cartridges and to move the robot about within the automated library system, using a drive mechanism on the robot.

In contrast, Miyoshi teaches a guide rail device adapted to move a horizontal carrier by a magnetic force generated between the guide rail device and the carrier. (Miyoshi, Figs. 5, 6, 11 and 12, col. 3, ll. 64-67). The moving force of the carrier is caused by the repulsive force between a magnet on the carrier and a coil unit on the guide rail, and the direction of the carrier is determined by the attraction between the magnet and the coil unit. (Miyoshi, Figs. 5, 6, 11 and 12, col.3, ll. 34-44, and col. 4, ll. 7-10). In one embodiment, the magnet is attached to the underside of an upper portion of the carrier. (Miyoshi, col. 3, ll. 62-63). In another embodiment, the magnet is attached to the side of the carrier, and in a third embodiment, the magnet is mounted on the bottom of a center groove in the carrier. (Miyoshi, col. 6, ll. 17-30). In any case, the carrier is moved by a magnetic force that is generated between the coil unit and the magnet.

The Examiner characterizes Miyoshi as, "[using] the magnetic force [which] acts as the powering force of the drive mechanism which is the guide rails that move the carrier about the automated library system." (See, Final Office Action dated February 19, 2003 at page 2, ll. 17-19). Whether or not the Examiner has properly characterized Miyoshi, by the

Examiner's own characterization, which the Applicant does not concede, Miyoshi fails to provide at least one robot that comprises a drive mechanism that is configured to move the robot about within the automated library system.

In particular, in the carrier system for carrying mediums taught by Miyoshi, the moving force of the carrier is caused by the repulsive force between the magnet on the carrier and the coil on the guide rails. One of ordinary skill in the art would understand that the carrier taught by Miyoshi is a driven element (i.e., a mechanism driven by the repulsive force). Therefore, Miyoshi fails to teach or suggest at least one robot that comprises a drive mechanism that is configured to move the robot about, as set forth in claim 1.

In addition, neither Miyoshi nor Schantz, alone or in combination, teach or suggest a drive mechanism that is attached to a frame of a robot and that engages an automated library system, as set forth in claim 10. Miyoshi teaches the use of magnetic forces to move a horizontal carrier. The carrier in Miyoshi is driven by the repulsive forces created between the magnets. One of ordinary skill in the art would recognize that since the driven element in Miyoshi (i.e., the carrier) is driven by repulsive magnetic forces, Miyoshi does not teach or suggest the limitations of a drive mechanism that is attached to the frame of a robot and that engages an automated library system to move the robot about.

Furthermore, neither of the prior art references cited by the Examiner, alone or in combination, teach or suggest a robot comprising an electronic circuit that is in communication with a drive mechanism and an automated library system to facilitate control of the drive mechanism in accordance with commands from a library system controller, as set forth in claim 10. Miyoshi discloses the use of magnetic forces in order to control the movement of a carrier in an automated library system. Therefore, Miyoshi fails to teach or suggest a robot comprising an electronic circuit that is in communication with a drive

mechanism and an automated library system to facilitate control of the drive mechanism in accordance with commands from a controller.

Neither Miyoshi nor Schantz, alone or in combination, teach or suggest the method set forth in claim 17. The method in Miyoshi discloses the use of magnetic forces to move a horizontal carrier, while Schantz teaches a method utilizing a belt connected to a drive motor to move a printer cartridge. On the contrary, claim 17 teaches a method comprising inductively coupling an alternating current and converting the alternating current into a mechanical movement using a drive mechanism on the robot to move the robot about an automated library system.

The Examiner admits that Miyoshi fails to disclose the use of inductive coupling or alternating current in order to recharge the battery on the at least one robot. (See Non-Final Office Action dated September 30, 2002 at page 3, ll. 1-3). Instead, the Examiner depends on the teachings of Schantz to provide the required teaching of inductive coupling for recharging a battery on a robot.

Schantz provides a printer head cartridge that is driven by a belt connected to a drive motor. (Schantz, Fig. 3 and col. 4, ll. 7-8). In the preferred embodiment, the battery is recharged by means of inductive coupling between a primary coil and a proximity coil, where the proximity coil is attached to the cartridge. When the proximity coil is sufficiently close to the primary coil, an alternating current is sent to a recharge circuit which provides recharge current to the battery. (Schantz, Fig. 4 and col. 5, ll. 38-44).

Nowhere does Schantz teach or suggest at least one robot that comprises a drive mechanism configured to move the robot about. As such, Schantz fails to cure the deficiencies of Miyoshi. The cited references, alone or in combination, fail to teach or suggest the present invention and the rejection should be reversed.

The Examiner also fails to provide the motivation to combine the cited references. The Examiner contends that it would have been obvious to one of ordinary skill in the art at the time the invention was made to have incorporated the inductively coupled power system within the mobile element of Schantz with the carrier stocker system of Miyoshi so as to reduce the numerous electrical connections and wiring required in such systems. (See Non-Final Office Action dated September 30, 2002 at page 3, ll. 8-12).

However, to rely on a reference under 35 U.S.C. §103(a), it must be analogous prior art. "[T]he reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the invention was concerned." (MPEP §2141.01(a), citing *In re Oetiker*, 977 F.2d 1443, 1446, (Fed. Cir. 1992)).

Miyoshi is directed to a stocker box stocking a plurality of CDs and a player box adjacent to the stocker box. (Miyoshi, Abstract). Schantz concerns inkjet printhead electrical connections. (Schantz, Title). The present invention is directed to a scalable means for supplying power to a remotely controlled, semi-autonomous robot. (Title of present invention). As such, the cited references fail to either be in the field of the present invention or to be reasonably pertinent to the particular problem with which the invention was concerned (i.e., providing power to rail guided robots). (See, page 2, l. 11 through page 4, l. 2 of the present application). Therefore, there is no suggestion or motivation in the cited references for the combination urged by the Examiner.[1]

[1]Yet further, the present invention has been assigned a preliminary U.S. Classification of 318. (See, Filing Receipt, mailed May 30, 2000). Miyoshi has a U.S. Classification of 369/54. (See, Miyoshi, first page, item [52]). Schantz has a U.S. Classification of 347/19. (See, Schantz, first page, item [52]). As such, by the U.S. Patent and Trad3emark Office classifications, the present invention and each of the references cited by the Examiner are in a different class. Therefore, the Examiner has failed to provide evidence that the present invention and the cited references are in the same field of endeavor. To the contrary, the present invention and the cited references are classified in different fields.

Furthermore, the Examiner fails to provide adequate motivation to modify the teaching of Miyoshi as is required for a *prima facie* case of obviousness under 35 U.S.C. §103(a). The mere fact that references can be combined or modified, which Applicant does not concede with respect to the references cited here, does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination or modification. (See, MPEP §2143.01). The Examiner suggests that the combination of Miyoshi and Schantz would "reduce the numerous electrical components and wiring required in such systems." (See Non-Final Office Action dated September 30, 2002, page 3, ll. 8-12). However, the use of magnetic forces to drive the carrier taught by Miyoshi already alleviates the problem of numerous electrical components stated by the Examiner. Furthermore, Miyoshi discloses the advantages of magnets as a means to drive the horizontal carrier, and does not suggest or imply any modifications such as inductive coupling. (Miyoshi, col. 6, ll. 33-39).

Since there is no proper suggestion or motivation for the combination of Miyoshi and Schantz, the Examiner has used impermissible hindsight to combine the teachings of Miyoshi and Schantz to attempt to piece together the Applicants' invention. The teaching or suggestion to make the claimed combination must be found in the prior art, not in the applicant's disclosure. (See, MPEP §2143; see also, *In re Dembiczak*, 175 F.3d 994, 999 (Fed. Cir. 1999) ("Combining prior art references without evidence of...suggestion, teaching, or motivation simply takes the inventor's disclosure as a blueprint for piecing together the prior art to defeat patentability - the essence of hindsight.")).

The cited art, alone or in combination, fails to teach or suggest the Applicant's invention, as set forth in independent claims 1, 10 and 17. Regarding claims which depend from claims 1, 10 and 17, Applicant contends that these claims are patentable for at least the same reasons that claims 1, 10 and 17 are patentable. For these reasons, the Examiner has failed to make a *prima facie* case of obviousness under 35 U.S.C. §103(a) for the rejection of claims 1-21, and the rejection should be reversed.

IX. CONCLUSION

The Examiner rejected claims 1-21 as being unpatentable under 35 U.S.C. §103(a) over Miyoshi in view of Schantz. However, the Examiner has failed to establish a *prima facie* case of obviousness under 35 U.S.C. §103(a). In particular, the references cited by the Examiner, alone or in combination, fail to teach or suggest all the elements of presently pending independent claims 1, 10 and 17. In addition, the Examiner has failed to show a proper suggestion or motivation for combining the references. Dependent claims 2-9, 11-16 and 18-21 are patentable for at least the same reasons that claims 1, 10 and 17 are patentable. Therefore, the final rejection of claims 1-21 should be reversed.

The fee of $320.00 as applicable under the provisions of 37 C.F.R. § 1.17(c) is enclosed. Please charge any additional fee or credit any overpayment in connection with this filing to our Deposit Account No. 02-3978. A duplicate of this notice is enclosed for this purpose.

Respectfully submitted,

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Enclosure - Appendix - Claims on Appeal

X. APPENDIX - CLAIMS ON APPEAL

1. An automated library system having a plurality of data cartridges, the system comprising:

a plurality of storage cells to store the plurality of data cartridges;

at least one rail disposed adjacent to the plurality of storage cells;

at least one primary coil disposed proximate to the at least one rail;

a power supply connected to the at least one primary coil to produce an alternating current in the at least one primary coil;

at least one robot disposed on the at least one rail, the at least one robot being operative to insert and remove the plurality of data cartridges at least one at a time from the plurality of storage cells; and

a secondary coil disposed on each of the at least one robots respectively and positioned to inductively couple at least a portion of the alternating current in the at least one primary coil to the at least one robot; wherein,

the at least one robot comprises a drive mechanism powered through the secondary coil and configured to move the robot about within the automated library system.

2. The automated library system of claim 1 wherein the at least one primary coil is a plurality of primary coils.

3. The automated library system of claim 2 further comprising a second secondary coil disposed on each of the at least one robot respectively and positioned to

inductively couple at least a portion of the alternating current in at least one of the plurality of primary coils to the at least one robot.

4. The automated library system of claim 3 wherein a powerless region exists between adjacent ones of the plurality of primary coils, and wherein the secondary coil and the second secondary coil on each of the at least one robot are spaced apart from each other at least as far as the powerless region to maintain inductive coupling to at least one of the plurality of primary coils.

5. The automated library system of claim 2 further comprising a battery disposed on each of the at least one robots respectively to supply electrical power to the at least one robot.

6. The automated library system of claim 2 further comprising a switching unit coupled between the power source and the plurality of primary coils, the switch unit being operative to individually switch on and off the alternating current to each of the plurality of primary coils.

7. The automated library system of claim 2 further comprising a plurality of sensors in communication with the switching unit, the plurality of sensors being disposed proximate the plurality of primary coils, at least one sensor of the plurality of sensors being associated with each of the plurality of primary coils respectively to generate a signal informing the switching unit when the at least one robot is proximate the respective primary coil.

8. The automated library system of claim 6 further comprising a plurality of inductance sensors in communication with the switching unit and coupled to the plurality of primary coils, one inductance sensor of the plurality of sensors being coupled to a respective

one of the plurality of coils to generate a signal informing the switching unit when the at least one secondary coil is inductively coupled to the respective primary coil.

9. The automated library system of claim 6 further comprising a controller in communication with the at least one robot and the switching unit, the controller being operative to generate commands directing movement of the at least one robot among the plurality of primary coils and to command the switching unit when to switch on and off the alternating current to individual primary coils to manage distribution of the alternative current to the plurality of primary coils.

10. A robot for use in an automated library system having a controller and at least one primary coil carrying an alternating current, the robot comprising:

a frame;

a drive mechanism attached to the frame and engaging the automated library system to move the robot about within automated library system;

an electronics circuit disposed on the frame and in communication with the drive mechanism and the automated library system to facilitate control of the drive mechanism in accordance with commands from the controller;

a magnetic core disposed on the frame, the magnetic core having a first core member disposed on one side of the at least one primary coil and a second core member disposed on the opposite side of the at least one primary coil, wherein the second core member engages the first core member to form a closed magnetic path and the second core member moves relative to the first core member to form a gap that allows insertion and removal of the magnetic core from the at least one primary coil;

a secondary coil wound around the magnetic core and electrically connected to the electronics circuit, the secondary coil inductively coupling at least a portion of the alternating current from the at least one primary coil to the electronics circuit.

11. The robot of claim 10 wherein the coupling is a set of complementary guide surfaces provided in the first core member and the second core member that enable the second core member to slide relative to the first core member.

12. The robot of claim 11 further comprising a resilient member disposed between the first core member and the second core member to bias the first core member and the second core member towards each other.

13. The robot of claim 10 wherein the coupling comprises a hinge attached between the first core member and the second core member.

14. The robot of claim 13 further comprising a resilient member disposed between the first core member and the second core member to bias the first core member and the second core member towards each other.

15. The robot of claim 10 further comprising:

a second magnetic core disposed on the frame, the second magnetic core having a third core member and a fourth core member;

a second magnetic core disposed on the frame, the magnetic core having a third core member disposed on one side of the at least one primary coil and a fourth core member disposed on the opposite side of the at least one primary coil; wherein the fourth core member engages the third core member to form a closed magnetic path and the fourth core member moves relative to the third core member to form a gap that allows insertion and removal of the second magnetic core from the at least one primary coil;

a second secondary coil wound around the second magnetic core and electrically connected to the electronics circuit, the second secondary coil inductively coupling at least a portion of the alternating current from the at least one primary coil to the electronics circuit.

16. The robot of claim 10 further comprising a battery disposed on the frame and electrically connected to the electronics circuit to supply electrical power to the electronics circuit.

17. A method of operating an automated library system having a plurality of data cartridges, wherein the automated library system has at least one robot operative to move adjacent to at least one primary coil, the method comprising;

providing an alternating current in the at least one primary coil;

inductively coupling at least a portion of the alternating current in the at least one primary coil into the at least one robot to produce a secondary alternating current;

converting the secondary alternating current into a mechanical movement of the at least one robot; and

directing the mechanical movement of the at least one robot to manipulate the plurality of data cartridges at least one at a time and to move the robot about within the automated library system, using a drive mechanism on the robot.

18. The method of claim 17 wherein the at least one primary coil is a plurality of primary coils, and the step of providing the alternating current in the plurality of primary coils comprises:

determining a relative position between the at least one robot and each of the plurality of primary coils;

applying the alternating current to each of the plurality of primary coils proximate the at least one robot; and

removing the alternating current from each of the plurality of primary coils distant from all of the at least one robot.

19. The method of claim 17 wherein the at least one primary coil is a plurality of primary coils, and the step of inductively coupling the alternating current comprises:

inductively coupling at least a portion of the alternating current in a first primary coil of the plurality of coils into the at least one robot to produce a first secondary alternating current; and

inductively coupling at least a second portion of the alternating current in a second primary coil of the plurality of coils into the at least one robot to produce a second secondary alternating current.

20. The method of claim 19 wherein the step of converting the secondary alternating current into the mechanical movement comprises:

rectifying the first secondary alternating current to produce a direct current in response to producing the first secondary alternating current;

rectifying the second secondary alternating current to produce the direct current in response to producing the second secondary alternating current; and

converting the direct current into the mechanical movement to manipulate the plurality of data cartridges in response to producing the direct current.

21. The method of claim 17 further comprising:

providing a battery on each of the at least one robots to provide a direct current; and

wherein the step of converting the secondary alternating current into the mechanical movement comprises:

rectifying the secondary alternating current to produce the direct current; and

converting the direct current into the mechanical movement to manipulate the plurality of data cartridges and move the robot.